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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/597,987	10/18/2006	Ingo Schwirtlich	06093	8865

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DENNISON, SCHULTZ & MACDONALD
1727 KING STREET
SUITE 105
ALEXANDRIA, VA 22314

EXAMINER	
SONG, MATTHEW J	
ART UNIT	PAPER NUMBER
1714	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/597,987	SCHWIRTLICH ET AL.	
	Examiner	Art Unit	
	MATTHEW J. SONG	1714	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 December 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *25-34 and 36-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *25-34 and 36-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 25-29, 32-34, 39 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freedman et al (US 4,968,380) in view of Arvidson (US 2003/0131783).

Referring to claim 25, Freedman et al teaches a process for conveying solid particles through at least one pipe or pipe system **60, 90** having a curve (**82** is a chamber which connects pipe **60** and **90** and the chamber is curved, thus the chamber **82** is curved and part of the pipe system and a pipe is broadly interpreted as a hollow body for conducting a liquid, gas or solid) where in fluid (Ar gas) is used for conveying the solid particles (Fig 2, col 3, ln 35-60; col 4, ln

35-65; col 5, ln 1-40). Freedman et al also teaches that the silicon melt replenishment system is intended to operate with spherical silicon beads but the system can also be operated using irregularly shaped silicon particles having a specific dimensional characteristic (col 5, ln 60-68).

Freedman et al does not explicitly teach conveying irregular geometry particles as first solid particles and admixing them second solid particles of regular geometry. Freedman et al does teach the system can operate with spherical, regularly shaped silicon particles and irregularly shaped particles (col 5, ln 60-68). Therefore, It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Freedman et al by combination regular and irregularly shaped particles because combination of known equivalents for the same purpose is prima facie obvious (MPEP 2144.06) and combinations of spherical beads and irregular silicon chunks is conventionally known in the art to be used to form silicon melts, as evidenced by Arvidson (US 2003/0131783) in paragraph [0019]. Furthermore, the use of silicon spherical beads and silicon irregular chunks is used to fill voids in a crucible to increase density ([0019]); therefore It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Freedman et al to supply spherical and irregularly shaped silicon to fill a crucible and fill gaps, as taught by Arvidson et al, to increase the density of silicon within a crucible using a single feeding apparatus.

The combination of Freedman et al and Arvidson et al teaches irregularly shaped pieces obtained by breaking CVD polysilicon logs ('783 [0020]).

Referring to claim 26, the combination of Freedman et al and Arvidson et al teaches irregularly shaped particles ('380 col 5, ln 60-68). The combination of Freedman et al and Arvidson et al does not teach polygonal geometry. Changes in shape are prima facie obvious

(MPEP 2144.04); therefore the use of polygonal geometry would have been obvious to one of ordinary skill in the art.

Referring to claim 27, the combination of Freedman et al and Arvidson et al teaches spherical particles ('380 col 5, ln 60-68).

Referring to claim 28, the combination of Freedman et al and Arvidson et al teaches the apparatus is intended to be used with spherical beads, however can be used with silicon particles of irregular geometry ('380 col 5, ln 60-68). Therefore, It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Freedman et al and Arvidson et al by using a high percentage (50-99%) of spherical beads because the invention is intended be used with spherical beads.

Referring to claim 29, the combination of Freedman et al and Arvidson et al teaches Ar gas fluid ('380 col 5, ln 20-40).

Referring to claim 32, the combination of Freedman et al and Arvidson et al teaches a L/D ranges from about 1 to 1.2 ('380 col 5, ln 60-68), which is within the claimed range.

Referring to claim 33, the combination of Freedman et al and Arvidson et al is silent to the maximum length of the solid particle is the radius of the pipe. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Freedman et al and Arvidson et al by using particles with a maximum length equal to the radius of the pipe such that particles can flow through the pipe without clogging the pipe. Also, changes in size are prima facie obvious (MPEP 2144.04).

Referring to claim 34, the combination of Freedman et al and Arvidson et al teaches irregularly shaped pieces obtained by breaking CVD polysilicon logs ('783 [0020]).

Referring to claim 39, the combination of Freedman et al and Arvidson et al teaches the particles are accelerated by the Ar gas ('380 col 5, ln 1-60).

Referring to claim 41, the combination of Freedman et al and Arvidson et al teaches Argon gas ('380 col 5, ln 1-60).

3. Claims 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freedman et al (US 4,968,380) in view of Arvidson (US 2003/0131783) as applied to claims 25-29, 32-34, 39 and 41 above, and further in view of Nagai et al (US 5,900,055).

Referring to claim 36, the combination of Freedman et al and Arvidson et al teaches all of the limitations of claim 36, as discussed above, except the silicon melt is doped using doping elements present in the particles of irregular geometry.

In a method of growing crystals from a silicon melt, Nagai et al teaches a dopant feeding apparatus for charging a predetermined amount of dopant and dopant containing granular silicon (col 2, ln 1-10 and col 7, ln 1-67).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Freedman et al and Arvidson et al by supplying a particles containing a dopant, as taught by Nagai et al, to produce a crystal having a desired dopant concentration and resistivity ('055 col 1, ln 5-67).

Referring to claim 37, the combination of Freedman et al and Arvidson et al and Nagai et al teaches boron and phosphorous ('055 col 1, ln 20-40).

Referring to claim 38, the combination of Freedman et al and Arvidson et al and Nagai et al does not teach the claimed concentration of the dopant particles. However, concentration is

well known in the art to be a result effective variable; therefore It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Freedman et al and Arvidson et al and Nagai et al by optimizing the concentration of dopant particles by conducting routine experimentation of a result effective variable to obtain a desired resistivity (MPEP 2144.05). Also, the combination of dopant particles with different concentrations would have been obvious to one of ordinary skill in the art because combinations of known materials suitable for their intended purpose is prima facie obvious (MPEP 2144.07).

4. Claims 30, 31, 40, 42-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freedman et al (US 4,968,380) in view of Arvidson (US 2003/0131783) as applied to claims 25-29, 32-34, 39 and 41 above, and further in view of Mackintosh et al (US 6,562,132).

The combination of Freedman et al and Arvidson et al teaches all of the limitations of claim 30, as discussed above, except the fluid is supplied in pulses.

In a method of crystal growth, Mackintosh et al teaches silicon particles are introduced to a crucible to replenish a melt in the crucible during a growth process, and it is common practice to deliver the particles in predetermined intermittent basis according to the rate of consumption of the melt so as to maintain the level of the melt within predetermined limits (col 1, ln 10-65).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Freedman et al and Arvidson et al by supplying the fluid intermittently (pulses) to supply the particles in a predetermined intermittent basis according to the rate of consumption of the melt so as to maintain the level of the melt within predetermined limits, as taught by Mackintosh et al.

Referring to claim 30-31, the pulses are either regular or irregular.

Referring to claim 40, the combination of Freedman et al and Arvidson et al teaches a conical deflecting element **66** ('380 col 3, ln 35-65). The combination of Freedman et al and Arvidson et al does not teach a baffle element surrounding the pipe, passing around the outer edge in the area of the melt and having a spherical surface section geometry. Mackintosh et al teaches particles impinge upon a deflect which deflects them back down toward a conical upper surface of an umbrella shaped feed director, which clearly suggests a baffle surrounding a feed tube and passing particles around the outer edge in the area of the melt, and the particles slide down the director surface and fall into the melt along the outer edge (Fig 1-2 and col 5, ln 35-67 and col 8, ln 1-67). Mackintosh et al also teaches the inclined surface reduces the velocity of the particles so the particles will cause little or no splashing, thus eliminating the mushroom problem (col 8, ln 1-40). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Freedman et al and Arvidson et al by using the director (baffle) taught by Mackintosh et al to reduce splashing of particles, thereby avoiding the mushroom problem. As to the spherical surface section geometry, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Freedman et al, Arvidson et al and Mackintosh et al by using a spherical surface section geometry because changes in shape are prima facie obvious (MPEP 2144.04) and the combination of Freedman et al, Arvidson et al and Mackintosh et al teaches an umbrella shape which suggests a spherical surface geometry.

Referring to claim 42, the combination of Freedman et al, Arvidson et al and Mackintosh et al teaches an EFG process where the process may be used to grow shaped bodies with

rectangular or circular configurations ('132 col 10, ln 55-67 and col 11, ln 1-40), thus one of ordinary skill the art would have found obvious to produce wafers as the shaped body because changes in shape are prima facie obvious (MPEP 2144.04) and a wafer shape is conventionally known in the art.

Referring to claim 44, the combination of Freedman et al, Arvidson et al and Mackintosh et al teaches an after heater **190** surrounding the direction and deflector, thus the deflector and director are expected to be heated. The combination of Freedman et al, Arvidson et al and Mackintosh et al is silent to the temperature, however temperature is well known in the art to be result effective variable; therefore It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Freedman et al, Arvidson et al and Mackintosh et al by optimizing the temperature by conducting routine experimentation of a result effective variable. (MPEP 2144.05).

Referring to claim 43 and 45, the combination of Freedman et al, Arvidson et al and Mackintosh et al teaches the dimensions of the deflector and direction and angles may be may be to adjust the velocity of particles ('132 col 10, ln 55 to col 11, ln 10), which clearly suggests the adapting the geometry. As to claim 45, changes in the shape of the deflector and director would have been obvious to one of ordinary skill in the art to control the distribution and velocity of particles.

Response to Arguments

5. Applicant's arguments filed 11/15/2010 have been fully considered but they are not persuasive.

Applicant's argument that Freedman et al teaches a chamber and does not teach a pipe is noted but not found persuasive. Applicant alleges that a pipe is known to be a hollow cylinder. This is a narrow definition of pipe. The broadest reasonable interpretation of pipe is a hollow body for conveying a gas, liquid or solid. (See Merriam-Webster definition of "pipe"). The chamber **82** taught by Freedman conveys the particles from the particle dispenser through the pipes, thus reads on a pipe/pipe system with a curve.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., hollow cylinder) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The claims are directed to a pipe or pipe system and is not limited to hollow cylinders.

Applicant's argument regarding the combination of regularly shaped and irregularly shaped particles is noted but not found persuasive. Freedman et al does teach the system can operate with spherical, regularly shaped silicon particles and irregularly shaped particles (col 5, ln 60-68). Therefore, It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Freedman et al by combination regular and irregularly shaped particles because combination of known equivalents for the same purpose is prima facie obvious (MPEP 2144.06) and combinations of spherical beads and irregular silicon chunks is conventionally known in the art to be used to form silicon melts, as evidenced by Arvidson (US 2003/0131783) in paragraph [0019]. Arvidson teaches using spherical silicon beads and irregular silicon chunks to fill voids to increase density ([0019]). Thus, using the feeder taught by

Freedman et al to supply spherical and irregular silicon chunks would have been obvious to one of ordinary skill in the art.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Merck & Co., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Arvidson is not relied upon to teach a flow of silicon particles, which is taught by Freedman et al. The Examiner maintains filling the crucible with silicon spherical particles and irregular chunks as taught by Arvidson to fill voids using the feeder taught by Freedman would have been obvious to one of ordinary skill in the art.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. SONG whose telephone number is (571)272-1468. The examiner can normally be reached on M-F 11:00-7:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Kornakov can be reached on 571-272-1303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew J Song
Primary Examiner
Art Unit 1714

/Matthew J Song/
Primary Examiner, Art Unit 1714